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Where are all the science majors?

David A. Kaplan, contributorJune 9, 2010

FORTUNE -- In a move to measure its workforce not too long ago, Nationwide Insurance surveyed its 36,000 employees at the time. Its CEO was in for a shock. The single largest employment category had nothing to do with insurance and was instead "technology." The story is told by Brian Fitzgerald, executive director of the Business-Higher Education Forum (BHEF), to dramatize the transformation of the U.S. workforce. At Nationwide, an entire upper tier of computer scientists had to be brought in from India because the company didn't have enough in Ohio. "You can be selling insurance or manufacturing cars," Fitzgerald says, "but almost every American corporation has been turned into a technology operation."

Nationwide (NFS) isn't alone. The number of computer science degrees awarded to U.S. citizens from 2004 to 2007 (the latest figures available) declined 27%, according to the National Science Board. But the shortfall isn't just in computer science. Neither universities nor high schools are preparing enough U.S. students in so-called STEM subjects: science, technology, engineering, and math. While observers blame different causes -- lousy secondary schools, boring college courses, lazy students -- few deny a crisis exists.

For every new Ph.D. in the physical sciences, according to the Aerospace Industries Association, the U.S. graduates 50 new MBAs and 18 lawyers; more than half of those with bachelor of science degrees still enter careers having nothing to do with science. The ACT testing service says only 17% of high school seniors are both interested in STEM majors and have attained math proficiency. Even among students who begin college pursuing a STEM degree, only half wind up with one. Finding new STEM teachers has become especially urgent: As of two years ago, nearly 60% of U.S. workers with STEM degrees were 45 and older.

It used to be that universities didn't particularly worry about the number of STEM grads. But that was before the days of Google and the ravenous demand for technologists. Colleges are only starting to adapt. Calculus has long been known as a "STEM killer," so many schools are trying to get away from passive lectures and make students learn interactively with computers. Engineering schools are trying to introduce jazzier real-world problems into the curriculum. The Obama administration has focused on lower levels in the educational food chain. Earlier this year the President announced $250 million in federal spending and private investment to hire thousands of math and science schoolteachers.

For its part, BHEF has attempted to think anew about old assumptions, like the belief that smaller class size boosts student achievement. Working with BHEF, Raytheon (RTN, Fortune 500) systems engineers tried to gauge the effects of raising pay on attracting teacher talent; the analysis showed it might just result in higher pay across competing professions. Smaller classes, for example, may

simply mean less qualified teachers get hired because of inadequate supply. Fitzgerald himself well understands the STEM challenge: In 1970 he started college as a chemistry major -- and graduated with a literature degree.

Readers Comments (in the reversed time order):

Edward Voll: I have been hearingthis shortage crap for 40 years. My two bothers have Math teaching degrees (one a Masters) and no jobs. Microsoft must restart this story to get more visas for low pay foreigners. The school systems keep pushing for more math and science to graduate, but walk down any street and ask someone the last time they used algebra,calculus, physics, or chemistry on their job. Colleges, teacher unions, gov't workers, all push this higher and higher req. to justify their high pay.

Walter Bliss: I make kits and reagents that detect plant pathogens so hopefully I qualify as a scientist. The companies don't want to pay good salaries for the amount of education required. The companies actually prefer bringing workers from other countries at lower pay. I work with primarily citizens from other countries who have green cards for that very reason. I see US born scientists interviewed time after time but not hired because they cannot get a decent salary.

Kevin Jenkins: As a current Physics/Math major I believe I may have some insights as to why few of my peers wish to major in STEM subjects.1. Society tells them that science is overly complicated, and thus students develop a mental block that prevent them from learning concepts. These often happen in high school when a poor teacher is unable to adequately explain the causality of a problem or just from a gap in teaching the subjects (not learning something necessary for Pre-calculus in Algebra.)2. Poor high school teachers often cause this mental block or just lay a poor foundation for continuing the study of these subjects at the undergraduate level.3. Compensation for STEM majors isn't as competitive as that of doctors, lawyers or businessmen. If presented with a choice between having a job with twice the pay as a STEM career, why would one choose the lower-paying job?4. STEM majors ARE hard. Many students today don't wish to pursue a major that will make them work as hard as these majors require.

Richard Bartholomew: For most of my career, I worked for military contractors. So I didn't see as many foreign nationals (they had security clearance diffulcities, you see). At one of the non-military gigs I had, the place was crawling with Indian, Pakistani, and Chinese subcontractors.

I don't know how much the company was paying them, but most were friendly, technically competent folks. There was the usual spectrum from superstar to barely hanging on.

It was actually quite interesting talking with them. You find out things about their respective countries that you probably couldn't even find out easily on the web.

Wouldn't it be ironic if one fine day the tables turned and US American engineers and

programmers started to invade India, et al.? Don't laugh. The way things are going, it might just happen. Incidentally, Tamil for "H1-B visa" is " …..(can not be displayed)". It never hurts to be prepared.

Dave Head: Students are too smart to enter a field where employers simply bring in overseas workers to force the wage scale down. When there's some money in STEM, you'll have people clammoring to get into STEM. But as long as you have people coming from India, working for peanuts, living 10 to a house and sending their $$$ back home, you won't have people interested in getting a STEM-based education.

And, of course, management tends to keep all the profit for themselves that they can. The only cure for this is unions to force them to share-up, but tech-people would rather not be bothered with those. So, they BECOME management - the courses are easier and it solves the cash flow problem.

Leonardus Wahyu Setyakarya: There are many reasons why science majors are getting less and less:
1. Hard major but not enough pay for entry level even experienced. CEO and sales people eat all the money or jobs moved to India or other countries.
2. Many Science jobs moved to India because of less labor pay. I am surprised some of the company in Ohio brought science people from India, instead of the opposite.

My question is where all the science major salary goes? Without the science people this country will be behind in technology a few years from now.

Whitey Ward: The thousands of highly skilled telecomm trained technicians are an example of our misleading tech industry. Jobs evaporate as different generations of equipment are commissioned. Certification on one brand does not carry over to others. A tech can reach top pay in one generation only to start all over learning the next generation of technology. The constant chase to update qualifications for employment is endless in technology and the students of today are beginning to see the paper chase for what it is. Useless!

Jeffrey Zielonka: I have to agree with K Richard Overstreet here. I am a science guy with an MS in my field, and my salary is about half that of my soon-to-be brother-in-law who has a BS in a tech field and less experience. It's infuriating, but I can't afford to go back to school for another more financially relevant degree.

Facebook User: A lot of people here have hit the nail on the head: there is no shortage of qualified people with "STEM" backgrounds. There's a marked shortage of people who are willing to obtain this education to work for $40,000/year. The same problem exists in the medical field: there are "crisis" shortages of primary care physicians, registered nurses, and medical technologists.

You want people to go into fields that require a difficult education and a lot of sacrifice? Pay them for it. Otherwise, keep complaining, because it'll never change.

Here's another thing I'd like to mention. I am working on some personal projects that require Calculus based physics. Having been out of school for 20+ years, I decided I'd like to audit some math classes at my local colleges to refresh my memory. I found that even though the math classes are seldom full, the colleges won't allow you to audit the classes! (For those who do not know, auditing a class is what you do when you want to learn the material. You attend the class and take all of the tests, but you do not get credit for the class and do not earn anything toward a degree. The trade-off for this is that you generally only have to pay for 1 credit hour instead of the usual 3 credit hours. Shouldn't be a big deal if the classes are not full anyway!) I cannot afford to pay full price for the classes. So, we all lose. Luckily, I found www.educator.com. I can take ALL of the classes I was wanting to take. And, it costs $240 per year, unlimited!

Kelly Penix Robbins: I am one of the technology people - database engineer - without a technology job. Top in my class, loved what I did, raving reviews by employers, yet lost one job after another due to cuts, shipping jobs overseas, bankruptcy (Worldcom), and just plain nasty work environments (crazy overtime that you don't get paid for, insane deadlines, cranky co-workers who have had no sleep). I have met sooooooooo many others in the same boat. I too would not recommend it to others. I see article after article talking about shortages... they are barking up the wrong tree. Now, it may turn out to be a shortage since the word about current technology atmosphere... but right now, there is no shortage. I agree with all of the posts out here... the writer needs to take these comments seriously for the article to be believable.

Facebook User: There are a lot of very valid points presented in the comments here. Some, I haven't even considered. I'm not sure I can add to what has already been said except to say that I have been a computer scientist for 30 years now. Over the last 10 years or so, I have been steering young people away from the career. Over these last 10 years, almost all of my colleagues have lost their jobs, mostly due to outsourcing. I know of many more who have graduated with crushing student debt and they best they could find was a career flipping burgers. I myself saw the writing on the wall and started re-educating myself in a different part of computer science as a backup. Glad I did because I was laid off in my job and had to resort to the backup.

Don Leach 7:06 am
@ Richard - to make a contribution to the field a PhD is needed, but that's only if your developing new product or theory. There's need for engineering skills across the board in the workforce at technical and non-technical companies. Many companies are old or already have established product that they don't want to change...to just continue manufacturing and producing them...it takes engineers to maintain the equipment, change testing procedures as standards like NEC change. Those don't require a masters or PhD.

Even so, I've noticed engineering students seem more stressed, spend more non-class hours at school, have more homework, and have a higher drop out rate than say a communications major, childhood edcuation, etc. Why go through all that extra pain if there's no compensation increase to match it? (Other than interest in the field)

K Richard Overstreet 6:45 am
One problem if you're just looking at the numbers is that many in science go in with an eye towards grad school. There is little value to going for a bachelors in science. Any career where you would actually be doing real science is going to require a PhD. Even a Master's degree in science has little to no value over a BS.

Don Leach 6:37 am
Totally agree with Timm on the Pay issue. Two engineering degrees, and less than a year away from finishing a masters in electrical engineering and I know of folks in manufacturing with only HS degrees, that sit at a desk and check that points beep when you put probes on em make as much as me. I wish engineers were in the union :-(. All those years of school, hundreds of thousands in school debt and I only make 2$ more on the hour than someone just pressing a run button on a machine I designed.

Jim Mazzolini 6:36 am
Science and engineering is not a good career and kids going to college know it. I am an engineer and all my engineering friends are steering our kids away from an engineering career. Why 1) Pay is low; your starting salary and ending salary 30 years later (if you still have a job) is on average only 1.5 times different. 2) Most companies prefer young engineers recently out of college so the older engineers usually face layoffs and difficulty finding work again. 3) Many engineering jobs get outsourced to China, India, Hong Kong, and Taiwan for lower wages. It is very common in corporations for US engineers to work closely with China engineers training them who eventually take their jobs. Hard to compete with China engineers making $1,000 per month or less. 4) College is hard for engineering but the career payback being very poor. 5) Respect for engineers is low in corporations. The science professional is usually considered a geek.

Dorothy Pugh 6:30 am
We've lowered quality standards in computer science and related engineering fields. There is less fundamental innovation and more copycat applications. There is more focus on security, but with an endless stream of patches. That makes it easier to hire cheaper workers.

Timm Jowers 6:29 am
BTW, hedge fund managers are taxed at 15%. The top one made $4B. In contrast, an engineer is taxed at about 35%. So the 20% tax haven for the ultra-rich could have paid for 15,000 new Science and Math teachers!!! Saying Obama is allocating $750M when they give tens of billions or more in tax preference to finance is clear to those of us with an analytical education. The money is not in science; but Finance does use a lot of Math so Math can be profitable.

Timm Jowers 6:25 am
This article is bunk. There has NEVER EVER been a shortage of qualified scientists and engineers. There is a shortage willing to work for $30,000. That's why all the people in the company mentioned are from a foreign country. Now, NONE of the computer scientists I know recommend to their family to go into this field. You work very hard, have limited upside, and are always in danger of a layoff. In contrast, Garbage Men in Seattle make much more. So do

Firemen and even Prison Guards. Plus the last two at least have government retirement. Nope, the only sane choice is to get a government job. Anyone who goes into Science or Engineering does it purely for their own interest in the field. Anyone who makes a shrewd business decision would become a lawyer or government worker.

Richard Bartholomew 6:19 am
We used to call it the "ten-year cycle". It goes like this:

Year 1: There's a shortage of engineers!. Everyone and his uncle becomes an engineering freshman.
Year 4: His uncle graduates as an engineer. But there are still so many engineers that many have to learn how to say "paper or plastic" or "would you like fries with that" just to make ends meet.
Year 5: Everyone notices that there's a glut of engineers. Noone becomes an engineering freshman.
Year 10: Go to year 1.

Besides, who needs four years of the Bataan Death March during which you get to watch business and liberal arts majors flipping frizbees in the quad whilst you slave away in the lab? Not only that, but ten years later you'll still be making squat while they're pulling down millions.

I might be stupid, but I'm not crazy.

Facebook User 6:17 am
The people who encourage young students to pursue STEM should first give them higher salaries (per equivalent level of educational investment) than MBA's and lawyers. If you want the students to flow in, then STEM MSc's should be making $100k, and STEM PhD's should be in the mid 100's.

Facebook User 6:16 am
Wait a sec here.. 8 years ago.. All the computer science kids were here. There was tons of them. What corporations did was outsource their jobs to india. Now, they're bringing in indian to work at sub par wages and complaining that there's no "computer science" work force. NEWSFLASH. YOU KILLED IT! They made movies about it... ever seen office space?

Facebook User 5:28 am
why do only 4 people out of my graduating class of 30 engineers have jobs then? me being one of the lucky few.

Facebook User 5:27 am
Eric's comment rings true. I have my Ph D in Chemical Engineering and am having trouble finding a permanent position in my field. The problem is companies no longer value any kind of technology worker and get away with continued operations by bringing in foreigners at low wages. Imagine spending 8+ years in college and getting nothing more than temporary work as a postdoc (poor pay) or even worst unemployment. Until our society wakes up and realizes these jobs require skill and proper compensation, domestic students will not enter into the STEM fields.

Facebook User 4:43 am

Some argue we have too many scientists, not too few, and they do make some valid points.

http://wuphys.wustl.edu/~katz/scientist.html

[I]nstead of obtaining a real job two years after the Ph.D. (as was typical 25 years ago) most young scientists spend five, ten, or more years as postdocs. They have no prospect of permanent employment and often must obtain a new postdoctoral position and move every two years. . . .

Typical postdoctoral salaries begin at $27,000 annually in the biological sciences and about $35,000 in the physical sciences (graduate student stipends are less than half these figures). Can you support a family on that income?